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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,201	01/25/2005	Gyo Muramatsu	MURAMATSU2	8346
1444 7590 09/11/2007 BROWDY AND NEIMARK, P.L.L.C. 624 NINTH STREET, NW SUITE 300 WASHINGTON, DC 20001-5303			EXAMINER PICKARD, ALISON K	
			ART UNIT 3673	PAPER NUMBER
			MAIL DATE 09/11/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/523,201	MURAMATSU ET AL.	
	Examiner	Art Unit	
	Alison K. Pickard	3673	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 5 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 7 and 13-18 is/are rejected.
- 7) ☒ Claim(s) 8-12 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted Prior art (APA) (spec. pages 1-4, particularly page 4) in view of Japanese Patent 57-74334 (JP '334) in view of Hanning 5,560,283 (evidence only).

Applicant admits that it is known to coat a piston ring with a PI or PAI material. And, Applicant admits that a PI or PAI-silicon dioxide hybrid material provides improved mechanical strength and heat resistance while maintaining softness and extensibility. However, Applicant does not disclose the piston is coated with a resin comprising either PI-SiO₂ hybrid or PAI-SiO₂ hybrid and a solid lubricant. JP '334 teaches an improved coating comprising a resin comprising PI material and an additional lubricant, such as molybdenum disulfide or boron nitride. The additional lubricant is a friction modifier and thus improves the wear resistance. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the coating of the admitted prior art with an additional solid lubricant as taught by JP '334 to provide good wear resistance with or without lubrication.

Regarding claim 2, JP '334 does not appear to disclose the particle size. However, it is not considered inventive to discover the workable or optimum ranges by routine experimentation

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absent the showing of criticality for such ranges. See *In re Aller*, 105 USPQ 233, 235 (CCPA 1955). And it is known to use a solid lubricant with a resin coating having the claimed particle size and percentages as evidenced by Hannig. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to use particles of the required size and percentages.

3. Claims 1-3 and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onoda in view of Applicant's APA in view of Hanning (evidence only).

Onoda discloses a piston ring having resin binder coating comprising PAI and a solid lubricant dispersed therein. Onoda does not disclose the coating is a PAI hybrid material. Applicant teaches that PAI-silicon dioxide hybrid material is an improved material that offers improved mechanical strength and heat resistance while maintaining softness and extensibility. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the resin by using the improved PAI-SiO₂ hybrid material taught by Applicant's to improve the coating functions.

Regarding claim 2, Onoda does not appear to disclose the particle size. However, it is not considered inventive to discover the workable or optimum ranges by routine experimentation absent the showing of criticality for such ranges. See *In re Aller*, 105 USPQ 233, 235 (CCPA 1955). And it is known to use a solid lubricant with a resin coating having the claimed particle size and percentages as evidenced by Hannig. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to use particles of the required size and percentages.

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4. Claims 1-4, 6, 7, and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onada in view of Murase (2004/0052649) in view of Hanning (for evidence).

Onada discloses a piston ring having resin binder coating comprising PAI and a solid lubricant dispersed therein. Onoda does not disclose the coating is a PAI hybrid material. Murase teaches a silane modified PAI hybrid material with a solid lubricant for use on sliding components in engines. Murase teaches the solid lubricant is added in the claimed percentage ranges. Murase teaches the silane modified material provides improved heat, abrasion, and seizure resistance as well as improved adhesion over non-silane modified resins. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the piston ring coating by using the PAI-SiO₂ hybrid material taught by Murase to provide improved heat, abrasion, and seizure resistance as well as improved adhesion.

Regarding claim 2, Onoda does not appear to disclose the particle size. However, it is not considered inventive to discover the workable or optimum ranges by routine experimentation absent the showing of criticality for such ranges. See *In re Aller*, 105 USPQ 233, 235 (CCPA 1955). And it is known to use a solid lubricant with a resin coating having the claimed particle size and percentages as evidenced by Hannig. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to use particles of the required size and percentages.

Allowable Subject Matter

5. Claims 8-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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6. Claim 5 is allowed.

Response to Arguments

7. Applicant's arguments filed 6-15-07 have been fully considered but they are not persuasive.

The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). In this case, Applicant admits that PI or PAI-SiO₂ hybrids provide improved mechanical strength and heat resistance while maintaining softness in extensibility. These are benefits, aside from preventing aluminum adhesion, which would be desirable when selecting coatings for sliding surfaces such as piston rings. Such benefits suggest it's obvious to at least try such materials. Further, the "Plastic Age" article states that such hybrid materials have excellent adhesion when tested on various substrates (see page 3). Goda '868 also discloses that these hybrid materials can be used effectively in a variety of environments including IC sealing materials (see col. 10, lines 35-40). And Murase '649 provides additional evidence that these hybrid materials are used on sliding engine components. This provides further support that one of ordinary skill would consider selecting a PI or PAI-SiO₂ hybrid materials. Regarding claim 2, it is still considered obvious to select the claimed range for the particle size given Hanning. Hanning relates to solid lubricants in a PI coating. Claim 13 has been added to the rejections since Applicant's prior art and Murase all recite back to the same process as Applicant uses to make the hybrid material (disclosed in JP '670).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alison K. Pickard whose telephone number is 571-272-7062. The examiner can normally be reached on M-F (10-7:30), with alternate Friday's off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tricia Engle can be reached on 571-272-6660. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Alison K. Pickard
Primary Examiner
Art Unit 3673

AP